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## ABSTRACT

This paper examines Kentucky's school-finance formula and student outcomes as related to the implementation of the Kentucky Education Reform Act (KERA) of 1990. The report provides background information on KERA and describes the creation of the Support Education Excellence in Kentucky (SEEK) funding mechanism, a three-tiered system composed of three distinct but closely related components. The paper focuses on the effects of centralization on SEEK. It looks at past funding strategies for education and provides a review of educational literature on school finance and the relationship of funding to student achievement. It offers a review of school-finance litigation and concludes that the effect of variables on indicators of student achievement produces a largely inconsistent finding. Included in the report are the results of a study in which data from public records for 176 local districts were gathered from the Kentucky School Board Association. The study asked such questions as: To what extent do selected financial characteristics contribute to student performance at the school-district level? Findings show that only one of the three selected financial characteristics influenced the district-level score. Comparisons of district expenditures indicate that significant revenue and spending gaps among Kentucky's 176 school districts still exist. (Contains 30 references.) (RJM)

SUPPORT EDUCATION EXCELLENCE IN KENTUCKY (SEEK):  
IMPACT ON STUDENT OUTCOMES

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## SUPPORT EDUCATION EXCELLENCE IN KENTUCKY (SEEK): IMPACT ON STUDENT OUTCOMES\*

Several events have renewed public and private interest in school finance: successful court challenges to existing state finance formulas, congressional debates related to charter schools and vouchers, and proposals by presidents and state governors for national educational goals and competency tests. This paper looks at the Kentucky school finance formula and student outcomes as related to the implementation of the Kentucky Education Reform Act (KERA) of 1990.

### Statement of Problem

Public school finance reform and school restructuring are prominent policy issues at the federal, state and local levels of government. All fifty states enacted school finance reforms between 1970 and 1990 that changed the way schools are funded (Odden & Picus 1992). A number of factors have made school finance reform difficult to achieve. Among these are property tax disparities, inequities in growth of property assessments, unavailability of an equitable system of taxation and educational accountability as measured by student performance. The stated goal of KERA is to provide equity and adequacy of defined academic goals, as indicated by student outcomes. If student results are not consistent with the school finance adjustments intended in the policy, can the goals of the reform be realized?

What are the independent variables that are predictors of student outcomes, as indicated by the Kentucky Accountability Index scores (the dependent variable) at the school district level? Independent variables are components of Support Education Excellence in Kentucky (SEEK), the funding formula of KERA, and other selected district

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characteristics including equivalent tax rates, per pupil expenditures for instructional purposes, and average teacher salary.

### Background

On March 29, 1990, the Kentucky General Assembly passed KERA which mandated a complete restructuring of the Kentucky public elementary and secondary educational system in the areas of finance, governance, curriculum and assessment. Historical milestones in Kentucky education reform began in November 1985 when sixty-six property poor school districts filed a lawsuit (Council for Better Education, et al. v. Wallace Wilkinson) seeking equal resources for equity in education. On October 14, 1988, Franklin County Circuit Court Judge Ray Corns ruled in favor of districts filing the lawsuit but did not order a remedy. Upon appeal by the leaders of the General Assembly (Rose v. The Council for Better Education, Inc.) the Kentucky Supreme Court, on June 8, 1989, declared Kentucky's entire system of public schools unconstitutional and ordered the Kentucky General Assembly to create "an efficient system of common schools" as required by the Kentucky Constitution (section 183). As a consequence of the supreme court decision, Governor Wallace G. Wilkinson and leaders of the General Assembly formed a "Task Force on Education Reform," to develop a comprehensive recommendation to address the court's decision.

As a result of the recommendations of this task force the Kentucky General Assembly enacted House Bill 940, the "Kentucky Education Reform Act" of 1990. On April 1, 1990, Governor Wilkinson signed KERA into law and the law took effect on July 13, 1990. It is important to note that the Kentucky case, Rose, is unique in the field of school finance. Ever since *San Antonio v. Rodriguez* (1973), in which a finance equity suit (some students, by accident of birth in a low property as opposed to a property-rich county have fewer educational resources) was rejected at the federal level, equity-based lawsuits have

moved to the state level. Kentucky was simply the latest in a long line of states in which these suits had been brought and won. Figure 1 provides a flow chart of Kentucky school reform.

### SEEK

Prior to the passage of KERA, equity of funding had been an important educational issue in Kentucky for some time. The underlying principle cited in support of financial equity was that inadequate funding resulted in low levels of student learning; thus, pupils who live in communities with low financial resources are deprived of an equal opportunity to learn. Other financial indicators, including per pupil property assessments, local community tax effort, teacher salaries and the percentage of students classified as special education or at-risk students were also believed to be predictors of schools' ability to provide students the opportunity to achieve to high levels (Wise, 1968).

To compensate for these inequities, the General Assembly created a funding mechanism, Support Excellence in Education (SEEK), as a three-tiered system composed of three distinct but closely related components, including a foundation program with a guaranteed tax base and local revenue requirements and options. Base funding levels, adjustments, enforcement of maximum class size limits, and allotments of program funds are outlined by statute (Kentucky School Laws, 1996, pp. 246-249).

SEEK begins with an adjusted base guarantee. The adjusted base guarantee represents an amount of revenue per pupil to be provided for each school district adjusted by a series of factors that affect the cost of providing services to students. The base amount is adjusted by four factors--exceptional children, transportation, at-risk pupils, and pupils receiving services in a home and hospital situation. The following adjustments are a means of directing additional state funds to students and districts with special and varying needs:

First, an adjustment for exceptional children is a weighted calculation that considers the number of identified children with various exceptionalities.

Second, an adjustment for transportation is determined by applying the formula contained in Kentucky Revised Statute (KRS) 157.370.

Third, an adjustment for at-risk pupils is determined by applying a factor of .15 for each pupil approved for free lunch under the National School Lunch Program.

Fourth, an adjustment for students who are unable to attend regular school sessions because of short-term health impairments (referred to as Home and Hospital) is determined by applying a formula found in KRS 157.270.

Kentucky Revised Statute 160.470 requires that each local school district levy a minimum Equivalent Tax Rate (ETR) of 30 cents per \$100 of assessed property value. This required "Local Effort" is the local contribution to the adjusted base guarantee. The difference between the Local Effort and the adjusted base represents the state SEEK contribution to the local school district.

The base amount is set by the General Assembly and is the only amount that is constant for all districts. Adjustments will vary depending on the needs of the student population in each school district; Local Effort will also vary from district to district depending on the property wealth and enrollment of the district. Additionally, all SEEK calculations are made on a per pupil basis and the specific amounts apply to each pupil in the district.

The second component of SEEK is Tier I. This is an optional component that allows local school districts to generate additional revenue of up to fifteen percent (15%) above the adjusted base guarantee. School districts whose per pupil property wealth is less than 150% of the estimated statewide average per pupil property wealth receive state equalization funds if they choose to levy this additional tax. Districts may participate at

any level up to 15% and the state provides equalization funds to guarantee that any district participating will receive the same revenue per pupil if they make the same tax effort. The tax rate levied by a local school board under Tier I is not subject to the public hearing nor the recall provisions contained in KRS 160.470.

The third component of SEEK is Tier II and is also optional. Tier II allows school districts to generate additional revenue up to thirty percent (30% of the amount generated by the adjusted base guarantee and Tier I). These funds are not equalized by the state; however, they are subject to a public hearing and recall provisions of KRS 160.470 apply. Tier II has the effect of placing a cap on the amount of revenue a local school district can raise, thereby maintaining some control over the disparity in per pupil revenues that might be available to local school districts.

The Rose v. Council decision addressed the inequity in Kentucky based on property wealth and concomitant educational opportunities, i.e., students in wealthier districts were provided opportunities and inputs not available to students in less wealthy districts. SEEK is the Commonwealth's commitment to "assure substantially equal public school educational opportunities for those in attendance in the public schools of the Commonwealth . . . [and to] provide for an efficient system of public schools throughout the Commonwealth" (Rose v Council). In short, Kentucky has underwritten school reform with considerable new state and local financial resources.

Given the mandate of the Kentucky Supreme Court (Rose v. Council) and the subsequent action of the 1990 General Assembly, there can be no doubt that Kentucky's funding system for education attempts to provide adequacy and equity for children. In their definitive work on equity in school finance, Berne and Stiefel (1984) note two groups have captured the attention of equity scholars: children who receive educational services and the taxpayers, who provide for those services through taxes (p. 7). Adequacy and

equity for taxpayers may be important and may be affected by the desire to provide equity for public school children. Nevertheless, the intended group for whom an adequate and equitable education is to be provided is clearly the public school children of Kentucky. Accordingly this study attempts to determine the relationship between school district performance on the Accountability Index assessment and components in the SEEK formula.

### Delimitation of Topic

Considering the multiple areas of possible investigation, this paper will focus primarily on the effects of centralization, as evidenced by the state finance formula, SEEK, in relation to school district performance on the state mandated Accountability Index assessment.

Because of limited space, the focus of the study will exclude consideration of vertical equity. Vertical equity refers to unequal treatment of unequals. For example, a student with special needs, such as a profoundly handicapped student, requires more extensive resources and special instructional programs and should not be treated the same as a student who does not require additional services (Berne & Stiefel, 1984). The SEEK formula compensates for such cases. In addition to the base ADA funding, each special needs student generates an additional weight, e.g., speech is .24 and moderately handicapped is 1.17.

Horizontal equity refers to equal treatment of equals (Berne & Stiefel, 1984). For example, a student at a certain grade level in a regular program in one school district is considered equal to a student at the same grade level in a regular program in another school district. In school finance equity, horizontal equity means that equal students in separate school districts receive equal financial support. Vertical equity is beyond the scope of this study; that is, we accept the vertical weights as defined in SEEK. Analysis to

determine a more accurate set of weights is not possible here, nor will adjustment be made in the level of expenditures for inflation. Consideration of issues related to racial equality in schools, between schools, within or between school districts is also beyond the scope of this study.

There are many indicators of local school community involvement and support for local schools which affect the financing of schools. These factors are not considered in this study. This study is limited to an analysis of the relationship of factors included in the Kentucky School finance formula and the performance of school districts on the state Accountability Index assessment. KERA defines the Accountability Index to include the Kentucky Instructional Results Information System (KIRIS) academic score as well as noncognitive indicators. Although the KIRIS score represents the achievement component of the Accountability Index, it is not examined separately in this study.

### Political Realities

During the last fifteen years strong calls for educational reform have been made by key public decision-makers. Presidents, governors and legislators have met to discuss major changes in American education. The concern of these public decision-makers is reflected in A Nation at Risk (National Commission on Excellence in Education, 1983) and the National Goals statement that emerged from the 1989 National Governor's Conference in Charlottesville, Virginia, America 2000 (U.S. Department of Education, 1990).

There have been two major goals reflected in the current education reform movement: adequacy and equity. Equity refers to the attempt to balance the inequality of educational resources and, to some extent, the uneven outcomes of educational progress. Greater consensus has been reached that student learning outcomes should be the primary focus of the educational process and that all students can learn when provided with the opportunity, time and resources to do so. The educational reform movement seeks to raise

the standards and expectations of students' performances. Politicians and educators alike talk about reaching world class standards, even to the extent of being "first" in the world in science and mathematics achievement (Goal 4, America 2000). Unfortunately, there are areas of conflict between the two major goals of adequacy and equity. The belief that all children can learn at high levels is sometimes translated into a culture in which all children are expected to learn at the same high levels with different levels of financial support depending on where they live rather than on differentiated instruction designed to meet individual learning needs.

As a result of the Kentucky school finance lawsuit, a sweeping declaration by the Kentucky Supreme Court established a new precedent in Kentucky. The Court held that the entire system of public schools, as organized, controlled and financed by the Kentucky General Assembly, was unconstitutional and violated the state's education provision, which states that the General Assembly shall establish "an efficient system of common schools throughout the Commonwealth," (Rose v. Council). The Court affirmed a lower Circuit Court decision which had earlier found that the state system of financing Kentucky schools was unconstitutional. The Supreme Court of Kentucky, however, expanded the decision beyond financing to encompass the entire statutory system that formed and financed the public schools.

Throughout the case, the plaintiff school districts maintained that the funding policy provisions which had evolved over the years created an inadequate and inequitable public school system. The emphasis on adequacy as well as equalization of resources was significant because the Court decision provided the General Assembly no alternative but to increase the overall funding as well as to eliminate disparities in revenues among local school districts. Thus, the issue was not one by which equalization was to be achieved by leveling down or decreasing funding. The court made it clear that the legislature was to

increase appropriations substantially. As a result of the Rose case, the General Assembly was compelled to modify the state system of taxation. The ultimate compromise between the Governor and the legislature resulted in a tax increase estimated at \$1.2 billion over the biennium, of which a substantial amount was dedicated to a resolution of the adequacy and equity problem in the public schools (Alexander, 1989). Thus KERA established the right, as outlined in the court decision (Rose v. Council), of each and every child to an adequate education based on the equitable distribution of resources.

### Research Questions

With the prominence of KERA in the national school reform movement (generally considered the most far-reaching and radical restructuring among the states), it is important to obtain empirical data to gauge its effects. In this study, the authors utilize Kentucky's Accountability Index assessment which is formulated to give a school score based on both academic (KIRIS) and noncognitive factors. This school score is cumulated to give a district level score, the subject of this effort. Thus the central focus of this study is, How does the financial reform under KERA (SEEK funding formula and related factors) affect student outcomes? To that end, specific research questions follow.

1. To what extent do selected financial characteristics contribute to student performance at the school district level, as measured by the state mandated Accountability Index assessment?
2. To what extent do specific variables included in SEEK contribute to student performance at the school district level, as measured by the Accountability Index?
3. To what extent do specific variables included in SEEK contribute to the district level Accountability Index score, controlling for selected financial characteristics?

## Review of Literature

This chapter includes a review of selected studies from the educational literature on school finance and the relationship of funding to student achievement. As a policy matter, funding in public schools is based on a number of variables assumed to be related to student achievement. Funding formula variables related to student achievement are significant to the extent that they should influence policy related to financing schools.

The issue is important because KERA was based upon the premise that financial inequity between and among school districts resulted in less opportunity for students to learn in school districts with fewer financial resources and with more challenging student populations. However, it should be noted that KERA defines accountability in terms of a combined index of academic (84%) and noncognitive (16%) factors. The literature reviewed below makes no such distinction, examining only the academic outcomes.

## Review of School Finance Litigation

The United States has no national system of education. The national constitution is silent on the matter, and the tenth amendment states: "The powers not delegated to the United States by the constitution, nor prohibited by it to the states, are reserved to the states respectively, or to the people."

Education is considered to be among the powers reserved to the states. Courts have accepted this interpretation of the Constitution, and the Supreme Court has repeatedly stated that federal courts may interfere with the actions of state and local school officials only when such actions somehow threaten a personal liberty or property right protected by the Constitution or where there is a violation of federal law.

School finance litigation has taken place in all fifty states with few cases heard before the U.S. Supreme Court (Odden & Picus, 1992). Two cases of note are Serrano v. Priest, a 1971 case in which a California court ruled that a child's education should not be based on the wealth of the child's school district, but on the wealth of the state and a 1973 Texas case, San Antonio v. Rodriguez, in which the U.S. supreme court overturned a lower federal court citing the position that education was not a fundamental right in the U.S. constitution and, as a result, school finance equity litigation was directed to the individual states (Connelly & McGee, 1987, p. 588).

A review of school finance litigation indicates there is considerable disagreement regarding the correlation between funding and educational opportunity, and there is an abundance of research supporting both sides of the debate. Underwood (1989, p. 414) determined that the majority of courts addressing the issue recognized the existence of a positive correlation between expenditures and educational opportunity.

Dayton (1993, p. 167) concluded that most courts carefully limit their involvement in school funding litigation to constitutional issues. Dayton also noted that all plaintiffs in

school finance litigation depend on the common assumption that the level of funding of a school district has a direct effect on the quality of programs provided and the education children receive. In a later study examining judicial involvement in public school funding reform, Dayton (1996) noted the difficulty this argument presents in that “even if researchers could demonstrate that the court decision had led to greater equity in funding, the difficulty of confirming that this increased equity in funding had led to increased equity in educational opportunity remains” (p. 20).

In order to achieve an equitable allocation of resources it may be necessary, according to Dayton (1996), to reduce the quality or quantity of services at one school or district to provide it to another, thus creating a values clash between equity and quality that is not easy to resolve. Dayton’s conclusion is supported in at least one subsequent study. Advancements in school equity have been hindered, according to Enrich (1995), as legislators and courts found setting standards very difficult because few stakeholders can agree as to what equity means and “because equity solutions threaten property rich districts” (Enrich, p. 158).

While plaintiffs in state school finance cases have based their cases on either equity or adequacy, Green (1996) points out that neither of these paradigms account for the possibility that school systems are inefficiently operated (p. 89). Green further explained:

Adequacy arguments have several advantages over equity formulations. First, adequacy arguments are based on state education clauses; therefore, plaintiffs do not have to go through tortuous arguments linking equity, education and the state constitution. Second, adequacy arguments are based on the widely-held belief that students deserve a satisfactory education. Third, unlike equity arguments, adequacy formulations do not threaten richer districts and will more easily withstand

legal challenges. Adequacy arguments suffer from four weaknesses. First, courts have had a difficult time agreeing on standards. Second, courts may avoid considering this argument because of separation of powers concerns. Third, courts and legislatures may hesitate to use adequacy approaches once they realize that they still may have to spend a great deal of resources. Fourth, adequacy funding formulations may permit large disparities. (p. 95)

In study of the equity consequences of school finance reform in Kentucky, using pupils as the unit of analysis, Adams and White (1997) determined that Kentucky experienced marked improvements in school finance equity as a result of the policy changes enacted in KERA but concluded that some disparity remained. Adams and White conclude “whether the current disparity in pupil revenue affects the adequacy of the state school system is a question for further analysis” (p. 180).

While school litigation drives policy, issues concerning equity, adequacy and efficiency of school funding formulas are yet to be resolved in the courts. The relationship between school funding and student achievement is at the heart of these studies and is examined next.

#### The Relationship Between Expenditures and Student Achievement

Childs and Shakeshaft (1986) conducted a meta-analysis of research on the relationship between expenditures and student achievement. Their review included 467 studies conducted since 1928, from which 45 were selected based on comparative criteria established by the researchers. The majority of the studies analyzed by Childs and Shakeshaft used the school district as the unit of analysis with statewide pupil achievement data based on standardized norm referenced achievement tests as the predominant measure of learning outputs. These researchers found “that the relationship between student achievement and the level of expenditures is minimal with those

expenditures which related directly to instruction, such as teacher salary and instructional supplies, having the most positive relationship to student achievement” (p. 261).

In a study conducted in British Columbia, Canada, a negative relationship between expenditures per pupil and student achievement was reported. Using the school district as the unit of analysis, Peter Coleman (1986) gathered data in 75 school districts on school district expenditures and student achievement in three grade levels as measured on standardized achievement tests in mathematics, science, and reading. Correlation analysis reported “consistently negative associations between costs and achievement” (p. 75). Coleman explained this finding with a caution that “some school districts in the province are disadvantaged by a combination of uncontrollably high costs and a student population with educationally unfavorable home environments” (p. 75).

Hanushek (1986) examined the findings of 147 separate studies of educational production functions and agreed with the findings of the Coleman (1966) report. Hanushek concluded:

The results are startlingly consistent in finding no strong evidence that teacher-student ratios, teacher education, or teacher experience have an expected positive effect on student achievement. Teacher experience appeared only marginally strong in its relationship . . . and there appeared to be no strong or systematic relationship between school expenditures and student performance. (p. 1162)

In a re-analysis of the data used by Hanushek, researchers Hedges, Laine and Greenwald (1994) suggest that the data from previous education production function studies do not support Hanushek’s conclusions. Using meta-analysis and starting with the 187 education production function equations used by Hanushek in his work, Hedges et al. concluded that:

With the exception of teacher/pupil ratio and facilities, there are at least some positive relations between each of the types of educational resource inputs studied and student outcomes. Those inputs showing a positive relationship to student outcomes included per pupil expenditures, teacher experience, teacher education, teacher salary and administrative inputs. In terms of the magnitude of the impact of various resources, per pupil expenditures and teacher experience demonstrate the greatest effect on student outcomes. The impact of other inputs (teacher salary, administrative inputs, facilities, class size, etc.) was more mixed. (p. 10)

Although it may seem contradictory that, overall, per pupil expenditures have such a clearly positive impact, while the effect of the inputs that make up overall spending (teacher salary, class size, etc.) is more mixed, Hedges et al. (1994) explain the pattern of results are consistent with the idea that resources matter, but allocation of resources to a specific area (such as reducing class size or improving facilities) may not be helpful in all situations. Hedges et al. concluded that local circumstances may determine which resource inputs are most effective.

In summary, Hedges et al. (1994) contend that the question of whether more resources are needed to produce real improvement in our nation's schools can no longer be ignored. "Relying on the data most often used to deny that resources are related to achievement, we find that money *does* matter after all" (p. 13).

In a later article Hanushek (1994) advocates that policies should develop organizations and incentive systems that directly reward performance. Too often, he maintains, policies require that certain inputs go into the educational system; districts then follow these policies without regard to their effectiveness. The alternative Hanushek proposes is for policies to concentrate on outputs, such as student performance, instead of inputs thought to be important in determining student success. Hanushek contends that

the education of children depends directly on the ability of schools to translate resources into student achievement.

The results of a study by Garris and Cohn (1996) indicated that performance-based school funding formulas could alleviate many of the concerns regarding fairness in providing educational opportunities for children. Their research suggests that facilitating improved student performance and meeting goals can be used to reward those students and school districts that are doing well, taking into account socioeconomic factors that could distort the measurement of performance.

#### Research Methodologies of Prior Studies

A survey of research methodologies revealed scholars utilized a variety of methods to conduct research related to the relationship between school funding and student achievement. Garris and Cohn (1996) utilized regression analysis in a study of data from all 91 school districts in South Carolina to analyze a proposed funding model. Using the percent of students in each school district qualifying for free lunch as a proxy for socioeconomic status, predicted and residual scores for the performance indicators of achievement, state exit exam score, and postsecondary enrollment were determined for each school district.  $R^2$  values, representing the percentage of variance in output scores explained by the percentage of students eligible for free lunch, was computed for achievement, exit exam and postsecondary enrollment. The residual scores were then standardized to a mean and standard deviation. These standardized performance indicators were averaged for each district to produce a performance indicator.

Gamoran (1996) conducted a multiple regression analysis to estimate the effect of attending a magnet school, catholic school or secular private school on the achievement of urban students in math, reading, science and social studies and subsequently compared these results to the achievement of students attending comprehensive public high schools.

White (1982) conducted a study of literature that considered the relationship between socioeconomic status and academic achievement by utilizing a meta-analysis. In applying this methodology, 248 studies were identified for possible inclusion. Sixty-three of the studies were judged inappropriate for inclusion; of the remaining 185 articles, 42 dealt only with philosophical issues, and 42 did not report the needed correlation coefficients. As a result, White's meta-analysis included 101 studies.

As previously noted, Childs and Shakeshaft (1986) and Hedges et al. (1994) also employed meta-analysis or research synthesis, a widely accepted statistical technique. Hedges et al. (pp. 5-14) explain that meta-analysis is designed to aggregate data from a wide variety of studies that test the same conceptual hypothesis although they may differ in the details of their design or their measurement techniques. Meta-analysis combines the information from individual studies and then utilizes it to derive a conclusion based on the entire set.

### Summary

This review of literature on the effect of variables on indicators of student achievement produces a largely inconsistent finding. This was due to inconsistent quality and format of studies with respect to the following key issues:

1. No separation of spending related to school funding formulas.
2. No separation of special education, at-risk or other categorical areas within a funding formula.
3. No separation of the effects of local wealth from the levels of socioeconomic status of students in a school community.
4. Inconsistency of student achievement indicators.
5. Inconsistency of funding formulas.

6. No consideration of the relationship between funding formulas and student achievement.

The view that the level of expenditures had a negligible effect on student learning was supported by comparisons of costs to achievement indicators. On the other hand, the opposite view was expressed, and supported, that funding does make a difference in successful schools.

A strong case is made that how money is spent is more important than how much money is provided. Funds appropriated for instructional purposes can make significant differences in student success as evidenced by indicators of student achievement.

The review of literature found that indicators of student achievement varied as did characteristics of effective schools and goals associated with success in schooling. The underlying theoretical perspective of this study is that the allocation of financial resources within funding formulas should be highly related to defined indicators of student performance.

No studies in the periodical literature were found that directly studied the relationship between Kentucky's school funding formula and student outcomes. Nor were any studies found that looked at a combined student outcomes index of both academic and noncognitive factors. This study sought to ascertain if higher student outcomes occurred, according to the Kentucky Accountability Index assessment system, as a result of the state funding formula (SEEK). More particularly, do school districts that spend more achieve more? Do school districts with higher rates of poverty spend more and achieve less?

### Methodology

#### Type of Study

This is a study of the impact of finance variables on school district level performance in the wake of Kentucky's reforms, i.e., do the factors incorporated into the finance equity

formula under KERA predict student outcomes. The research utilizes regression to examine relationships at the school district level between variables associated with SEEK, the Kentucky school funding formula, and Accountability Index scores, from the mandated state assessment.

### Sources of Data

Data from public records for 176 local districts were gathered from the Kentucky School Board Association. Data related to equivalent tax rates, property assessment per pupil, percentage of at-risk students, percentage of special education students and average teacher salary were obtained from the Division of Finance, Kentucky Department of Education. The Annual Financial Report, submitted in compliance with state law by Kentucky school districts to the Kentucky Department of Education, includes categorical receipts and expenditures for the prior fiscal year July 1 to June 30. Data related to expenditures for instructional purposes were obtained from this report.

The unit of analysis in this study was the school district, since the purpose of the research was to examine the relationship between the state funding formula and student outcomes. Results of student performance on the state assessment are available at the individual student, school and school district level. School district funding in Kentucky is at the school district, not at the school level, and consequently, school finance data at the individual student and school level are inconsistent.

There are two types of independent variables: one set of independent variables include those used as part of SEEK, the school funding formula for Kentucky, and another set are those associated with traditional finance for schools including the equivalent tax rate, average teacher salary, and expenditure per pupil for instructional purposes.

### Independent Variables

The independent variables include traditional finance factors based on literature on finance and school outcomes that Card and Kreger (1992) found to be significant to student achievement. Although a number of variables were identified, these three were cited consistently. An explanation of these district level control variables, as well as the SEEK funding formula variables, follows.

#### Selected Characteristics

**EQUIVALENT TAX RATE (ETR)** was the ratio of the total real estate property assessment divided by state and local taxes collected reported by the Kentucky Revenue Cabinet to the Kentucky Department of Education for the 1994-95 school year.

**AVERAGE TEACHER SALARY (AVE SAL)** was the total amount of salary paid to certified staff divided by the total number of certified employees reported to the Kentucky Department of Education for the 1994-95 school year.

**EXPENDITURE PER PUPIL FOR INSTRUCTION (EXP INSTR)** was the amount of dollars spent, on a per pupil basis, as reported to the Kentucky Department of Education by local school districts for instructional purposes during the 1994/95 school year.

#### School Funding Formula Measures

**PERCENTAGE OF SPECIAL EDUCATION STUDENTS (SP ED)** was the number of students receiving special education services in all categories divided by the school district enrollment at the end of the first month of the school year, as reported to the Kentucky Department of Education for the 1994/95 school year.

**PERCENTAGE OF AT-RISK STUDENTS (AT R)** was the number of students who qualified for free lunches according to federal guidelines, divided by the school district enrollment at the end of the first month of the school year, as reported to the Kentucky Department of Education for the 1994/95 school year.

**PER PUPIL ASSESSMENT (PPA)** was the total assessed value of real property as certified by the county property valuation administrator to the Kentucky Revenue Cabinet and reported to the Kentucky Department of Education divided by the school district average daily attendance at the end of the second month of the school attendance calendar, all for the 1994/95 school year.

#### Dependent Variables

The single dependent variable is the 1994/95 Accountability Index score (**SCORE**), the outcome variable which is calculated at the school district level. The Accountability Index (see below) includes both the KIRIS Academic Index and the Noncognitive Index as the statistic that describes the school district's (elementary, middle and high school combined) success on the academic and noncognitive goals set forth in KRS 158.645(1).

#### Other Key Definitions

The following definitions are referenced in the 1994-95 District Assessment Coordinator Implementation Guide (Kentucky Department of Education, 1994):

**ACCOUNTABILITY INDEX** is the statistic that describes the school or school district's success on the academic and noncognitive goals set forth in KRS 158.645(1).

**ACADEMIC INDEX FORMULA** is "(Mathematics \* .14 + Reading \* .14 + Science \* .14 + Social Studies \* .14 + Writing \* .14 + Arts and Humanities \* .07 + Practical Living and Vocational Studies \* .07)/.84. Note: Dividing by .84 places the Academic Index back on a scale with a minimum of 0 and a maximum of 144" (p. 1).

**NONCOGNITIVE INDEX FORMULA** includes attendance, retention, dropout rate, transition to adult life and reduction of physical and mental barriers to learning (currently being studied for future use). The noncognitive index represents 16% of the total accountability score in Cycle II and 16.67 in Cycle 1 (p. 54).

#### Procedures and Statistical Analysis

For comparative purposes, data were collected in the seven categories described above for all 176 public school districts in Kentucky. Local tax effort, per pupil property assessments, and average teacher salaries were recorded in addition to the dollars spent per pupil in each district for instructional purposes for the fiscal year 1994/95, five years after the implementation of the Kentucky legislation designed to assure equity. Data were also recorded concerning factors associated with assigned weights of the SEEK formula, including the percentage of students at-risk, as determined by free lunch status and the percentage of students identified as special education. In addition to these six dependent variables, the criterion variable (school district Accountability Index score) was also recorded.

The statistical data analysis utilizes multiple regression. Pedhazur (1982) recommends regression as appropriate when examining the relative influence of several independent variables on a dependent variable. Data are displayed in tables. Table 1 provides a summary of statistical analyses and variables associated with the research questions.

Table 1

Variables and Analysis per Research Question

Research Question	Variables			Analysis
	Independent	Control	Dependent	
1	Selected Characteristics		School District SCORE	Multiple Regression
2	SEEK Funding Formula		SCORE	Multiple Regression
3	SEEK	Selected Characteristics	SCORE	Multiple Regression

Generalizability

All local public school districts in Kentucky that offered an education program were included in the study; thus, the population and the results can be considered as a current reflection of the relationship between finances and student outcomes in Kentucky. However, the results may be limited for other states because of the sweeping nature of the KERA reforms (specifically Kentucky's Accountability Index assessment) and differences in funding formulas from state to state.

The authors never intended to have an exhaustive study of all factors related to student performance but rather to inform policy by studying the relationship which the selected components in a school funding formula can have on student outcomes.

### Results

Descriptive statistics for the independent and dependent variables are summarized in Table 2. Means, standard deviations, minimum and maximum values are included. The table was created using Excel 5.0 based on values for the variables from the 176 school districts in Kentucky.

Table 2

#### Descriptive Statistics

Source of Variance	Mean	S.D.	Minimum	Maximum
Equiv. Tax Rate	57.27	11.25	31.30	112.70
Average Teacher Salary	33,589.92	1,711.71	29,673.00	41,555.00
Expenditure for Instruction	884.59	502.5	302.43	5,262.76
Special Education	12.63	2.74	5.38	22.57
At-Risk	44.60	17.97	1.69	99.07
Per Pupil Assessment	153,757.78	65,295.36	54,746.00	496,487.00
District SCORE	45.56	5.21	32.20	64.70

Note. School district N=176.

The full correlation matrix for the seven variables--Accountability Index score plus three selected financial characteristics plus three SEEK formula factors--is presented in Table 3. Most of the individual correlations are statistically significant, which is to be

expected given a fairly large N of 176. However the strength of the associations is generally in the low to moderate range. The highest single correlation is between Per Pupil Assessment and Expenditure for Instruction (.8828) while the lowest, essentially random, is between % At-Risk and Equivalent Tax Rate (-.0248). All of the correlations for % At-Risk and % Special Education are negative except for that between these two variables (.3861) and between % Special Education and Equivalent Tax Rate (.1461).

Table 3

Correlation Coefficients

Source of Variance	SCORE	ETR	AVG SAL	EXP INSTR	SP ED	AT R	PPA
Equivalent Tax Rate	0.1479	1	0.3966	0.4638	0.1461	-0.0248	0.0794
Ave. Teacher Salary	0.2231	0.3966	1	0.4917	-0.1324	-0.1487	0.3470
Exp. for Instruction	0.4438	0.4638	0.4917	1	-0.0875	-0.5217	0.8828
Special Education	-0.2674	0.1461	-0.1324	-0.0875	1	0.3861	-0.1980
At-Risk	-0.5760	-0.0248	-0.1487	-0.5217	0.3861	1	-0.6547
Per Pupil Assess.	0.4373	0.0794	0.3470	0.8828	-0.1980	-0.6547	1

Note. School district N=176.

Research Question 1

To what extent do selected financial characteristics contribute to student performance at the school district level, as measured by the state mandated Accountability Index assessment?

To answer this question, the authors regressed the three selected financial characteristics--Equivalent Tax Rate, Average Teacher Salary, and Expenditure for Instruction--on the district level Accountability Index score. Because this is exploratory research and because of a fairly large N (176), the authors set alpha at .075, which slightly increases the possibility of a Type I error; the trade off is lowered risk of excluding a significant variable (Type II error). Given that any results of this study will be subjected to further testing, the benefit of lowered Type II error seems warranted.

Table 4

Regression of Selected Financial Characteristics  
on District Level Accountability Index Scores

Multiple R	.444				
R Square	.197				
Adjusted R Square	.192				
Standard Error	4.6863				
<u>Analysis of Variance</u>					
	Sum of Squares	df		Mean Square	
Regression	937.328	1		937.328	
Residual	3,821.306	174		21.962	
Total	4,758.634	175			
F= 42.680	Signif F = .000				
<u>Variables in the Equation</u>					
Variable	B	SEB	Beta	t	Sig T
Constant	41.382	.717		57.738	.000
EXP INSTR	4.606E-03	.001	.444	6.533	.000

From Table 4, it is evident that only one of the three selected financial characteristics contributes to the district level score; Expenditure for Instruction is highly significant, beyond  $p=.000$ . Thus although Average Teacher Salary and Equivalent Tax Rate had been found in previous studies to have an effect on achievement, in this study they are not significant.

Research Question 2

To what extent do specific variables included in SEEK contribute to student performance at the school district level, as measured by the Accountability Index?

The second research question was answered by regressing the SEEK funding variables--% At-Risk, % Special Education and Per Pupil Assessment--on district Accountability Index scores. For this analysis, only % At-Risk was statistically significant

beyond .000 but negatively associated. Table 5 presents the regression for the SEEK variables.

Table 5

Regression of SEEK Formula Factors on District Level Accountability Index Scores

Multiple R	.576				
R Square	.332				
Adjusted R Square	.328				
Standard Error	4.2750				
<u>Analysis of Variance</u>					
	Sum of Squares	df	Mean Square		
Regression	1578.691	1	1578.691		
Residual	3179.943	174	8.276		
Total	4758.634	175			
F=86.383	Significant F=	.000			
<u>Variables in the Equation</u>					
Variable	B	SEB	Beta	t	Sig T
Constant	52.911	.864		61.209	.000
AT R	-.167	.018	-.576	-9.294	.000

Research Question 3

To what extent do specific variables included in SEEK contribute to the district level Accountability Index score, controlling for selected financial characteristics?

This question represents, in effect, the complete model with respect to the three SEEK funding formula factors and the “control” traditional financial characteristics. The authors tested both a parsimonious model (only those variables that were significant from Research Questions 1 and 2) and the full model with all six independent variables. (The parsimonious model included the control variable, Expenditure for Instruction, and the SEEK variable, % At-Risk.)

It turns out that the parsimonious model excluded a variable that is statistically significant ( $\alpha = .075$ , as discussed above) in the full model. Per Pupil Assessment, one

of the SEEK factors appears in the full model but was not included in the reduced model because it was not significant in the SEEK factors regression (Research Question 2). In that analysis ( $t = 1.288$ ; Sig T = .199), Per Pupil Assessment was not significant even at a relaxed alpha of .075 (not shown in Table 5). Yet in the full model (see Table 6) Per Pupil assessment is statistically significant with a Beta standardized coefficient of  $-.274$  (Sig T = .064). This somewhat perplexing finding appears to be related to intervariable correlations among the independent variables. In the ideal regression, independent variables are to be uncorrelated or only slightly so. Two of the relationships among the independent variables that may be relevant include a correlation of .8828 between Expenditure for Instruction and Per Pupil Assessment and  $-.6547$  between % At Risk and Per Pupil Assessment, the two largest single values in the correlation matrix (see Table 3).

Table 6 presents the regression for the full model. At the less stringent alpha of .075, one of the control variables (Expenditure for Instruction) and two of the SEEK formula variables (% At Risk and Per Pupil Assessment) are significant with a Multiple R of .610 and Adjusted R Square value of .362. While this leaves about 64 percent of the variance unexplained, the 36 percent accounted for is clearly a substantive finding for policymakers.

Table 6

Full Model Regression of Financial Characteristics and SEEK Funding  
Factors on District Level Accountability Index Scores

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Multiple R	.610
R Square	.373
Adjusted R Square	.362
Standard Error	4.1660

---

Analysis of Variance

	Sum of Squares	df	Mean Square
Regression	1773.534	3	591.178
Residual	2985.100	172	17.355
Total	4758.634	175	
F=34.063	Significant F=.000		

Variables in the Equation

---

Variable	B	SEB	Beta	t	Sig T
Constant	52.217	1.922		27.169	.000
AT R	-.159	.023	-.546	-6.753	.000
EXP INSTR	4.161E-03	.001	.401	3.080	.002
PPA	-2.2E-05	.000	-.274	-1.868	.064

---

Also of note in Table 6 is the negative Beta weight (-.274) for Per Pupil Assessment, indicating that as Per Pupil Assessment goes up, district level Accountability Index scores go down. While this effect is statistically significant, the practical effect is not much, a .000022 change in district score per one unit increase on the independent variable, based on the unstandardized coefficient B. This is a small effect but is not completely trivial because Per Pupil Assessment is calculated in dollars and the standard deviation is 65,295.36 (see Table 2). A change in Per Pupil Assessment equivalent to a standard deviation would result in about 1½ points on the district score. But the negative weight, is to say the least, a perplexing result, especially given a first order correlation of .4373 between Per Pupil Assessment and Accountability Index score (Table 3). Again, it is likely the intervariable correlations produced this effect. Pedhazur (1982) notes that "High multicollinearity leads

to imprecise estimation of regression coefficients" (p. 235). In the first equation of the full model (only % At Risk entered) both the t value and partial correlation (not shown) for Per Pupil Assessment are positive ( $t=1.288$ ; Partial  $r=.097$ ). Yet in the second equation (% At Risk and Expenditure for Instruction entered), the t value and partial correlation have become negative ( $t=-1.868$ ; Partial  $r=-.141$ ), consistent with the negative Beta for Per Pupil Assessment in the third and final equation, as shown in Table 6.

### Discussion

Kentucky Revised Statutes list, as the first goal for Kentucky schools, to expect a high level of performance from all students. KERA, and consequently SEEK, are designed to achieve this goal. Overall achievement, as indicated by statewide KIRIS score results (only the academic portion), is improving. Little evidence, however, has been available regarding the effects of the SEEK funding formula on that progress, let alone on the broader Accountability Index. (This statement is true nationwide, not just in Kentucky.) Thus, the findings in this study have significance not only for Kentucky but for the wider field of school finance and achievement equity. Based on the results of this study and the issues raised in the Review of Literature, several points warrant discussion.

### Policy Consideration

First, how should funding be earmarked for Special Education and At-Risk children? That districts should be given more to educate these students, typically by a weighted formula reflecting both the number of these students and a differential weight based on the perceived severity of the handicapping condition, is developing into a consensus position.

In the current study, % Special Education, one of the three variables tested in the Kentucky SEEK funding formula, was not significant with respect to Accountability Index district scores. This suggests a degree of neutrality, a sense of appropriate balance, has been achieved with SEEK. The current weighting factors, ranging from 2.35 for severely

handicapped to .24 for students needing only speech therapy would seem to be allowing districts to provide the services and instruction that these students need.

On the other hand, % At-Risk was highly significant in the current study, clearly the most important single variable in the equation ( $R^2 = .332$ ). This suggests that school districts have been unable to counter the negative effects that environmental factors have on achievement. Even with the statewide funding based on the weighting of .15 per at-risk student, equity of student outcomes has not been achieved. What this study does not and cannot show, however, is whether the problem is the amount of resources (is a higher weighting needed) or rather, how the current resources are being spent. The current study is based on 1994-95 data, five years into KERA. Longitudinal comparisons would be needed to determine whether the SEEK formula, as currently weighted, is yielding a positive effect on achieving adequacy for "have" versus "have-not" students. Further studies at the school level would also be needed to determine the efficacy of current weights depending on the quality of education (school effectiveness research married to finance studies) i.e., examining both effectiveness and efficiency, a combination all too seldom examined in educational research.

The second issue raised by this research is wealth versus socioeconomic status (SES) of students. Although weighting for each student at-risk is becoming more accepted in today's policy world, the traditional means of accounting for equity was based on wealth in the county (e.g., total assessment of property value divided by the number of students). This study clearly shows that the SES of students is a more important factor. Per pupil assessment was statistically significant in the full study, but only when a relaxed alpha (.075) and the  $R^2$  Change was a mere .013, the last variable entered in the Stepwise regression. Further, as discussed above in the Results, Per Pupil Assessment had that perplexing negative beta weight. Although the effects were very small, increased wealth

equated to lower Accountability Index scores, in this study. Per Pupil Assessment is one of the SEEK funding formula factors. But with its significance being so marginal and the direction of effects the opposite of what would be expected, this study is hardly definitive in the ongoing debate on wealth vs. student SES. Clearly student SES is by far the policy option based on these results.

Third, three traditional financial characteristics, as identified from the literature, were examined along with the SEEK formula. Only Expenditure for Instruction was significant; Equivalent Tax Rate and Average Teacher Salary had no statistically significant impact on Accountability Index scores. Expenditure for Instruction in all likelihood functions as a proxy for educational quality. The mean (1884.59), standard deviation (502.5), minimum (302.43) and maximum (5,262.76) indicate considerable variance in how much a district expends. Also, this smaller factor, apart from the much larger, but statistically insignificant Average Teacher Salary, again suggests that it is how money is spent rather than on the total amount that is relevant.

Finally, just what is being affected? The nature of the dependent variable has clearly been given too little attention. In the current study, the school district Accountability Index score is composed of both a criterion referenced, authentically-oriented achievement instrument and noncognitive indicators developed to represent the curricular reforms defined by KERA as the centerpiece of the accountability system. As such, despite its imperfections, it does represent the essence of Kentucky's school reform effort and is appropriate as the dependent variable in a finance study. Having said this, there are other criterion possibilities, including Accountability Index growth scores (the essence of the accountability system, i.e., how much improvement does the school make, regardless of its student body composition). Then, too, there is the KIRIS Academic Index, which would represent the more usual approach of looking only at achievement. As well, there are

standardized achievement tests. Finally, there is the Noncognitive Index Formula (only 16% of the full Accountability Index but clearly important school outcomes), in addition to achievement. Virtually no research has looked at funding effects on these noncognitive indicators. In the wake of the recent rash of school shootings, Kentucky's efforts to measure these factors seems particularly farsighted. Education clearly involves more than pure academic pursuits. Only further studies can indicate the degree of consistency that financial factors have across different criterion outcomes.

### Recommendations

As a policy issue, the authors believe the Kentucky legislature should continue to review the school finance formula, particularly weights assigned to components of the formula directly related to student outcomes. If student outcomes desired are related to components of the SEEK formula, adjustments should be made to maximize the potential of resources in relation to these outcomes. These adjustments may not necessarily require more funds, but rather a reallocation.

Likewise, the criterion deserves more study. What are the effects of the funding formula on different dependent variables, as noted above? This is particularly important because so little research has examined these different outcomes.

Investigation of the development and implementation of SEEK revealed that, although additional funds are provided for at-risk students, there is no guarantee that students who qualify for free lunch under federal guidelines are at-risk, nor is there evidence that all students who do not qualify under federal guidelines are not at-risk. Further complicating questions related to funds provided for at-risk and exceptional children is the lack of a requirement that the funds be used for the benefit of students so categorized at-risk or evidence that additional funding received to compensate for at-risk and exceptional children has been spent for that purpose.

As a policy matter, both issues warrant additional study. Implications for further study include the need for longitudinal studies following the same group of students. Attempts should be made in future studies to examine in more detail the effect of the proportion of at-risk students, per capita income, taxable wealth, district size, district status as county or independent, district classification by population served, pupil teacher ratio or local tax effort. Local school districts that consistently produce higher outputs in all of their schools with the same group of students as well as different groups, in spite of a high proportion of economically deprived students or low wealth factors, should be closely studied to identify best practices in finance, governance and curriculum that contribute to higher student performance.

Finally, further study is needed on the intercorrelational relationship among independent variables. The negative relationship between Per Pupil Assessment and district scores, very likely due to these intercorrelations, warrants further investigation.

By continuing to review policy related to school finance and by adjusting the formula accordingly, the Commonwealth can assure that the greatest potential for improving learning outcomes for all the children of Kentucky is achieved.

### Conclusions

Comparisons of district expenditures (Table 2) indicate that there remain significant revenue and spending gaps among the 176 Kentucky school districts. This study indicates that there are relationships, of varying consequences, between resource allocations and performance on the state assessment. The strongest effect among the independent variables comes from one of the SEEK formula factors, % At-Risk, negatively associated, with a .332 R Square. The next largest effect is from Expenditure for Instruction, one of the selected financial characteristics included as statistical controls, with a .028 R Square Change. The only other significant variable in the full model regression was Per Pupil

Assessment, one of the SEEK factors, which was surprisingly, negatively associated, but only marginally significant with an R Square Change of .013.

These results indicate that, five years into KERA, the most important factor in the SEEK formula is % At-Risk. This factor is already weighted beyond normal ADA reimbursement, an additional .15 for each At-Risk student in a district. The negative beta weights indicate that districts in Kentucky have not yet achieved adequacy with respect to the outcomes of at-risk students. What is not clear from this study is whether this is a problem with weighting (a larger weight needed) or a quality issue with regard to efficient utilization of the resources available. The wide variance in quality evident in the school effectiveness literature would suggest, in parallel, that not all districts, nor schools within districts, are likely to utilize the resources at their command equally well.

Similar arguments could be made for the other significant variables. Expenditure for Instruction has a positive effect on district scores, but there is very likely considerable variance in the effectiveness and efficiency with which these resources are being utilized. There is also some evidence that this variable may not be consistently reported by the districts. As for Per Pupil Assessment, its effect is slight and the direction is negative, which counters intuitive thinking.

Taken together, these results lead to the conclusion that this study is only a first step toward understanding the relationship between SEEK funding and district level accountability in Kentucky. Finally, the authors note that the policy options of tinkering with appropriate weights versus more effective and efficient usage of existing resources may not be simply either/or, but both/and. Only further study can shed light on the most effective policy response to improving student outcomes and providing adequate educational programming in Kentucky.

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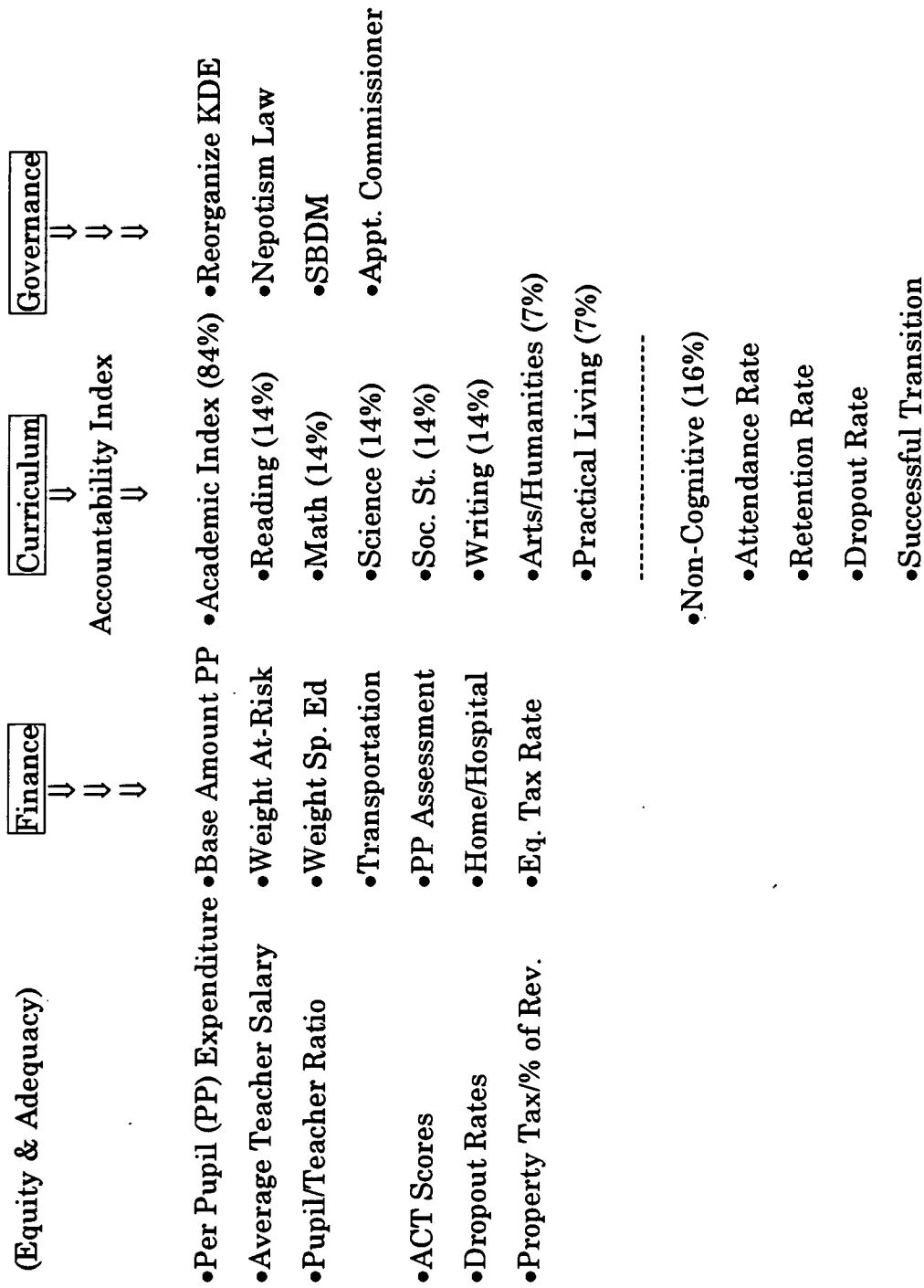
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Council v. Wilkinson  $\Rightarrow$  Rose v. Council  $\Rightarrow$  Kentucky Educational Reform Act of 1990 = Equity and Adequacy



**Figure 1. Flow Chart/Kentucky School Reform**



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